Farm Management Made Easier

# NMC-DC Irrigation

# User Guide

NETAFIM™

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# 1. GENERAL

## 1.1 Keyboard

Numeric- To enter values, quantities. Act as shortcuts to selections.

+/- Key- Toggles between positive and negative values and marks check boxes option selection. In a History screen, use to toggle between quantities and time format.

Arrows- Scroll up, down, left, and right to select menus.

MENU- To main menu, also acts as "ESC" and "Back" keys.

ENTER- Enter menu, submenu, value, open window, confirm a value or change.

HELP- Access help screens and graphs.

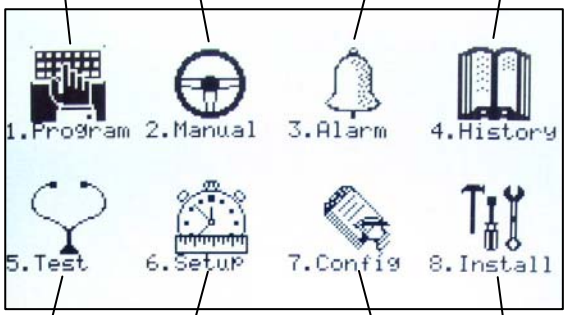
DELETE- Erases typing mistake.

## 1.2 Hot Screens

Press MENU from Main Menu to see Read-Only overview running processes. Press MENU again to return to Main Menu.

9 Hot Screens/Keys:
0- Hot Key- Icon of active actions/processes
1- Main Screen/System Status
2- Irrigation Process
3- Irrigation Program Status
4- Water, EC/pH, Dosing
5- Filter Flushing Status
6- Temperature & Humidity measurement
7- Weather Station measurement
8- System Pressure

## 1.3 Main Menu Icons




Conduct manual irrigation process, filter flush, system pause

Set alarm threshold, and reset

Programs: irrigation regimen, dosing recipe, filter flushing, entire program

Data log- irrigation log, water meter, and system event log

Manually test field devices (valves, pumps…), sensor values (EC, pH, temp, hum…)

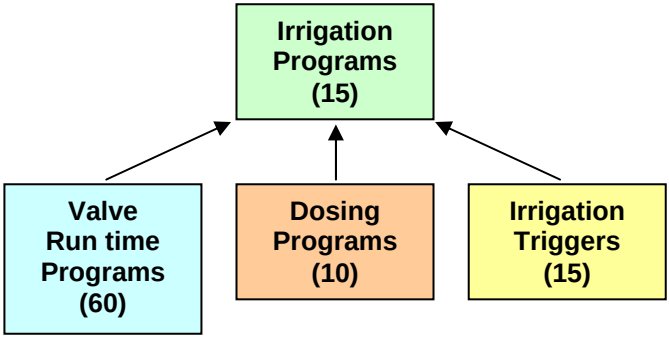
For professional technical use only

System set-up, time/date, sensors calibration, unit measurements

For professional technical use only

## 1.4 Introduction

To set an irrigation program-regiment/strategy- the grower must select necessary valves and set Run Time and Dosing program. May define 1 or more programs for 1 or more valves.




Run Time Programs-

- Based on Time or Quantity
- Set water *before* and *after* dosing process (fertilizer injection)

Dosing Programs (fertilization)

- Up to 8 dosing channels per program
- Dosing method per channel (Time, Quantity, EC/pH)

Irrigation Timing based on External Conditions

- Start/ Stop up to 2 Dry Contacts
- Start/End time for irrigation period
- Trigger Type

# 2. PROGRAM

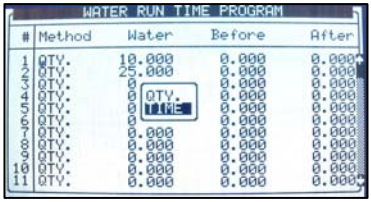
## 2.1 Run Time Program

**For every irrigation program, define a Run Time recipe**

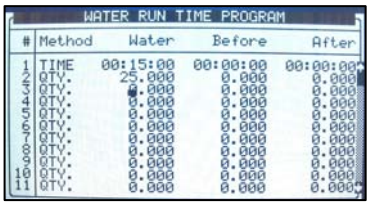
→ 2. Water Run Time

**Based on Time/Qty:**

→ Time/Qty. →

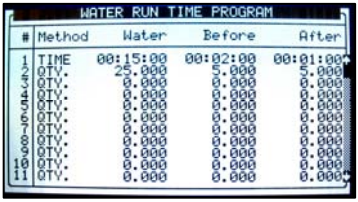


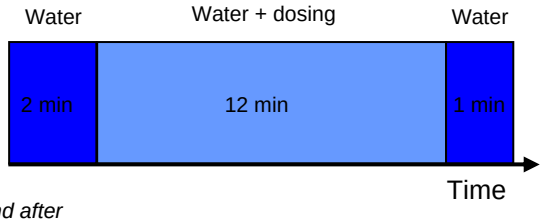

→ Define Time/Qty. →




→ Define value for "before" and "after" time program

**Water Before and After Dosing process:**




***NOTE:*** *Define total Time/Qty. Before and after deducted from total Time/Qty.*

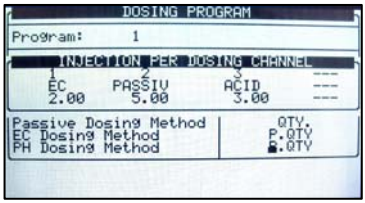
## 2.2 Dosing Program

**For every irrigation program, define a Dosing recipe**

3. Dosing

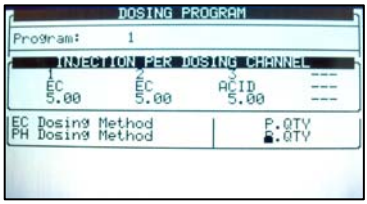
**Dosing Channel Definition (Channel mode pre-configured by technician):**

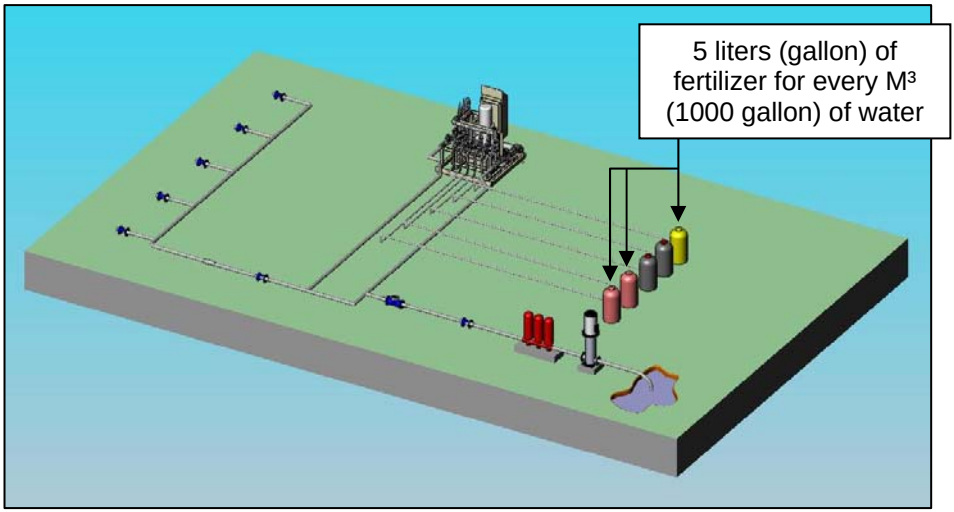
Channel




Define dosing method for specific channels (USA: Qty.=gallon)

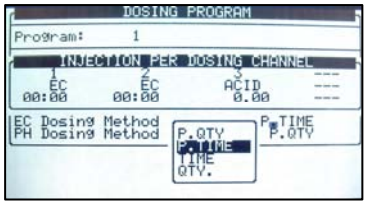
**Proportional Qty. (1/1000, Litre/m³, gallon/1000gallons):**



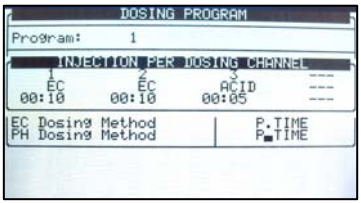



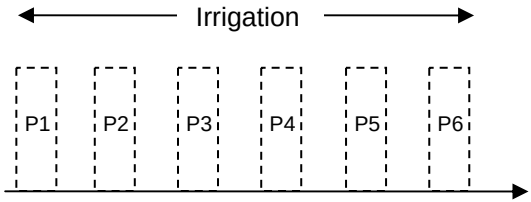
## Proportional Time:

P. Time




Define minimum dose for each channel



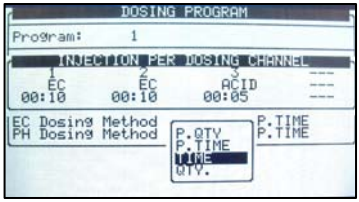

*Ex: Ch 1= P1+P2+P3…+Pn= 10 min.*

Time in pulses for Channel 1 or 2

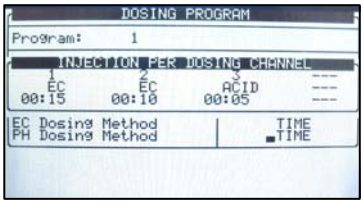
***NOTE:*** *Proportional Time= Take desired dosing time and spread out dose over irrigation program in open/close pulses per channel.*

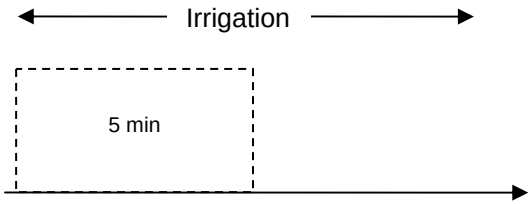
## Time:

Time




Define in 1 bulk: Open for a set time straight through, i.e. not spread out over a defined program.



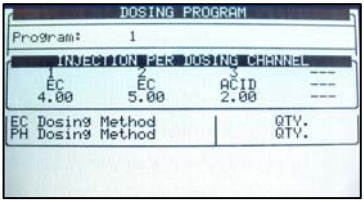




*Ex: Ch 3= P1= 5 min. (1 pulse)*

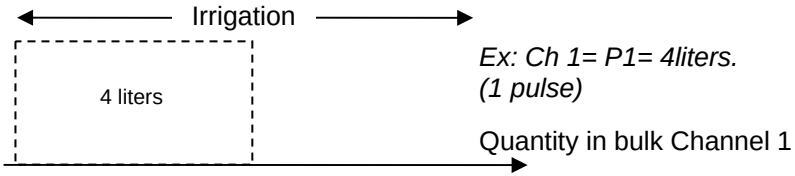
Time in bulk Channel 3

**Quantity:** (Example shows liters, in USA use gallons.)

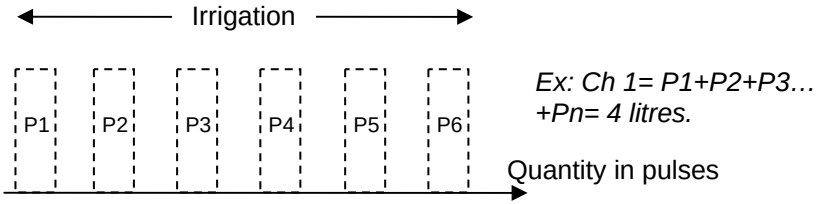
Qty.




- **Option A-** In Bulk (similar to Time above).

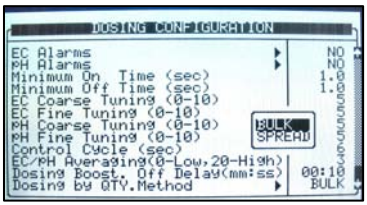



- **Option B**- Spread Out (According to dosing configuration done by technician).



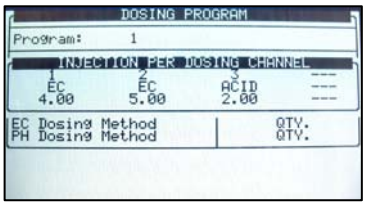
Main Menu

7. Dosing Configuration

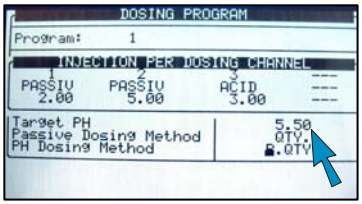



Define according to Bulk or Spread

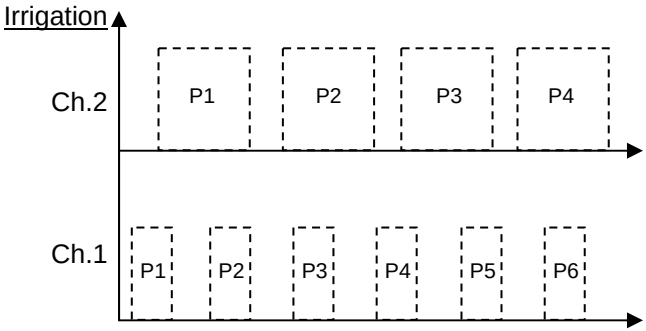
Back in Dosing Program menu, define Injection per Dosing Channel.



**Common Dosing Program for Open Fields (example):**

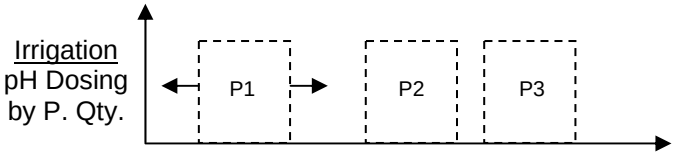



Fertilization (EC) amounts are fixed, no matter how much water goes through (channels 1 &2- Passive)
pH is controlled at 5.50




Ch. 1⇨ Spread Qty. = 2 liters
Ch. 2⇨ Spread Qty. = 5 liters

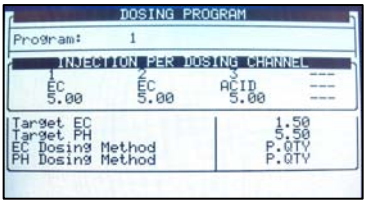
**Channel 3 (Acid channel) - Pulse width fluctuates according to controller calculations depending on pH levels to keep it on target.




3 liter ⇨ 1m³
pH Target = 5.5

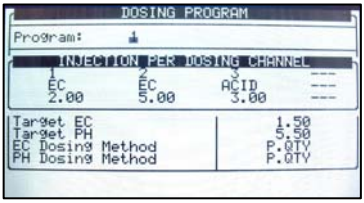
## Controlled EC/pH based on P.Qty. (example):

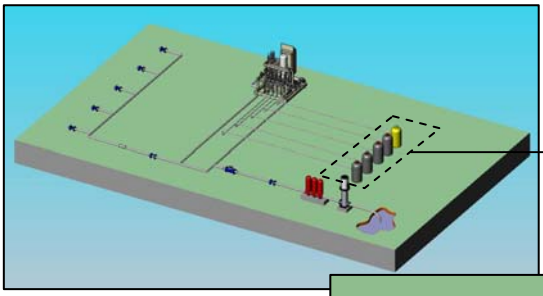
**Example A-**



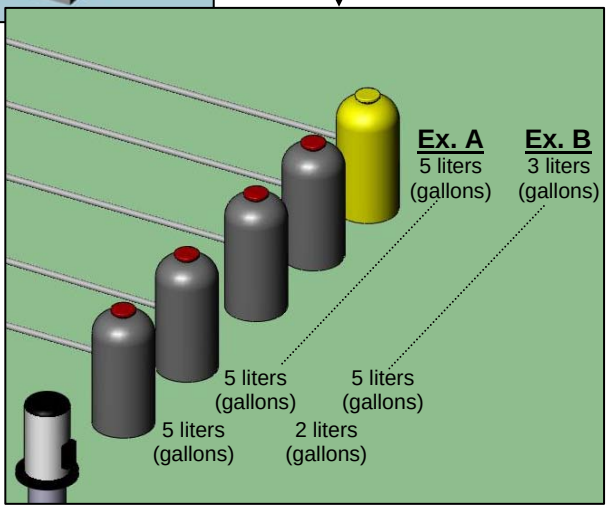

Define dosing program:
Nutrient amount and
desired EC/pH levels

**Example B-**



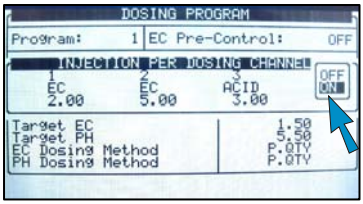
**Controlled EC/pH Target**
1.5 EC
5.5 pH

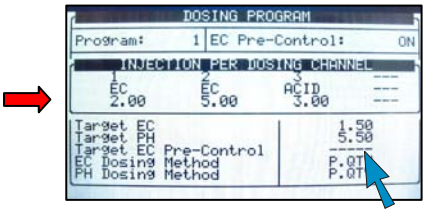


## EC Pre-Control (example if previously defined by technician):

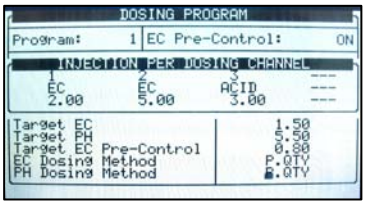
For hydraulic pre-control systems in greenhouses: When collecting excess water from drains, grower can set EC target before water goes through irrigation system.

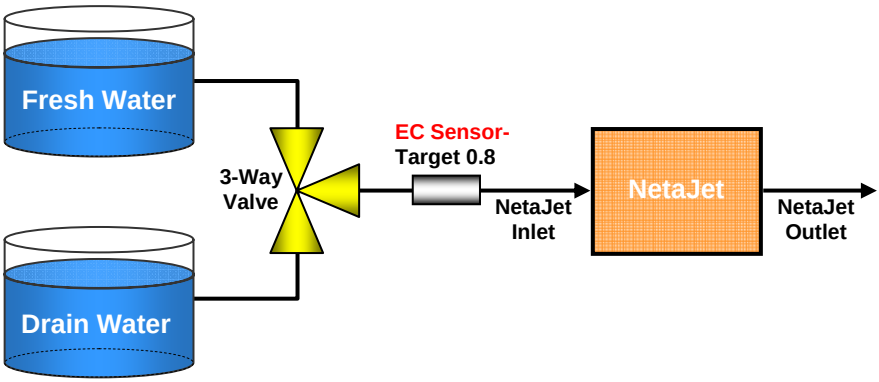
EC Pre-Control **ON**
*Only if this was pre-defined by technician during installation.




Define pre-controlled EC target

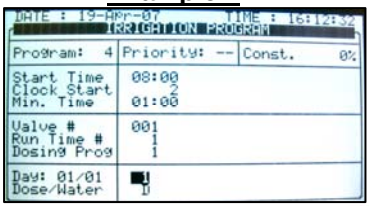


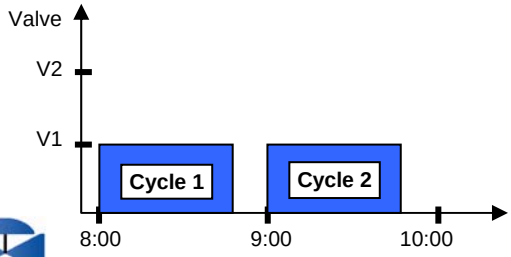
## 2.3 Irrigation Based on Time

1. Irrigation → Select program

**Example 1**

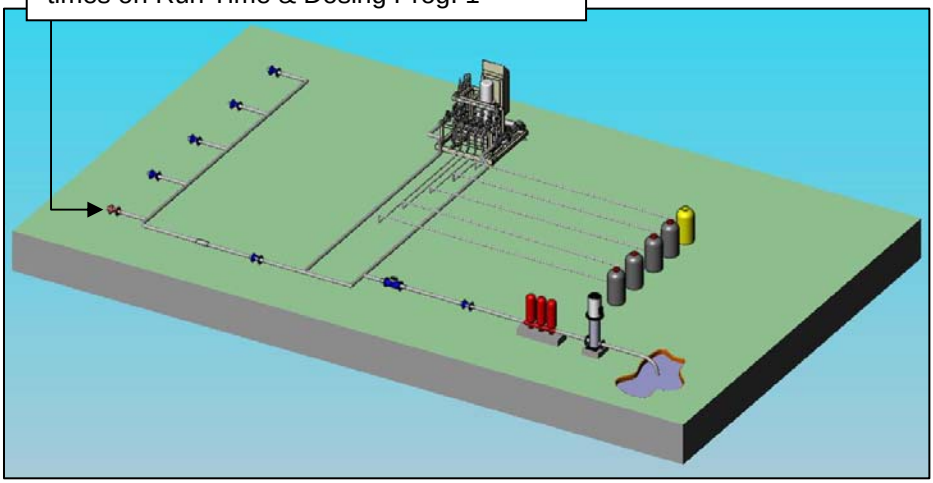



Irrigation program for 1 valve

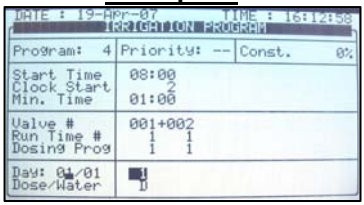



***NOTE:*** *Min. Time= Delay between cycles from start time to start time*
*Clock Start= Number of cycles*

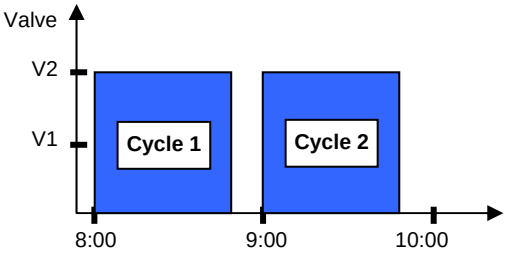
Valve 1- runs 2 cycles, 1 hour between start times on Run Time & Dosing Prog. 1



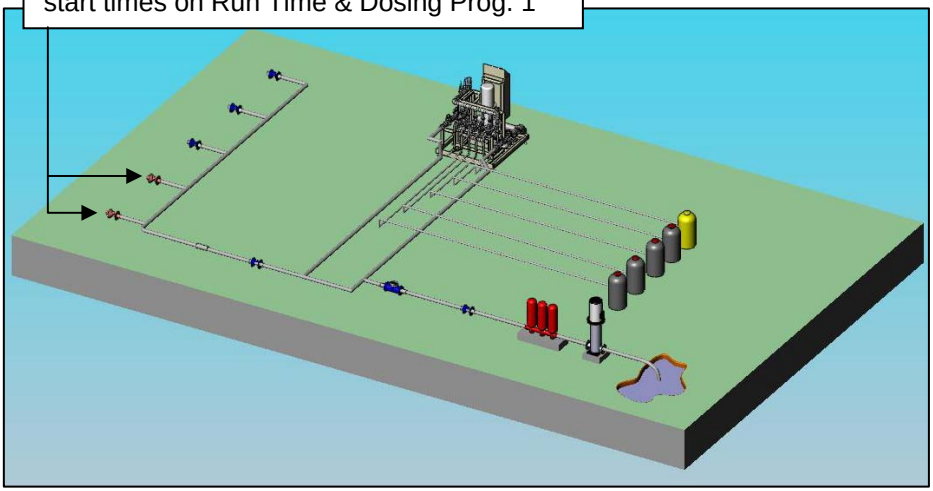
**Example 2**




Irrigation program for a group of 2 valves

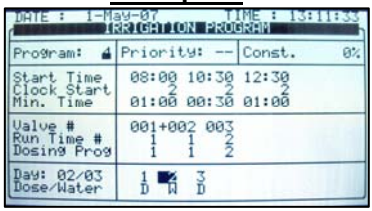



Valve 1 & 2- run 2 cycles, 1 hour between start times on Run Time & Dosing Prog. 1

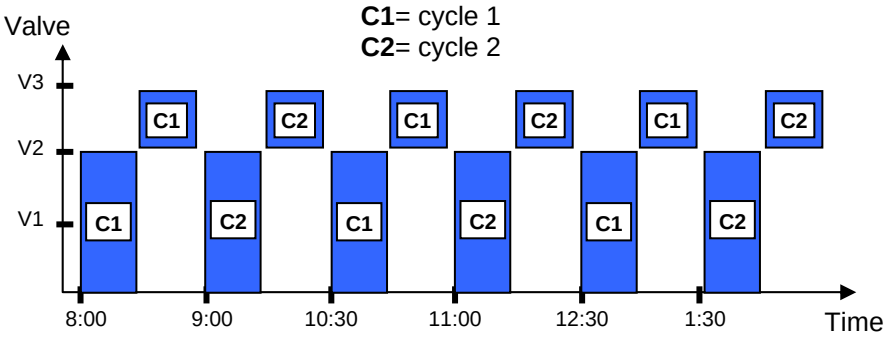


***NOTE:*** *Min. Time= Delay between cycles from start to start*
*Clock Start= Number of cycles*

## Example 3

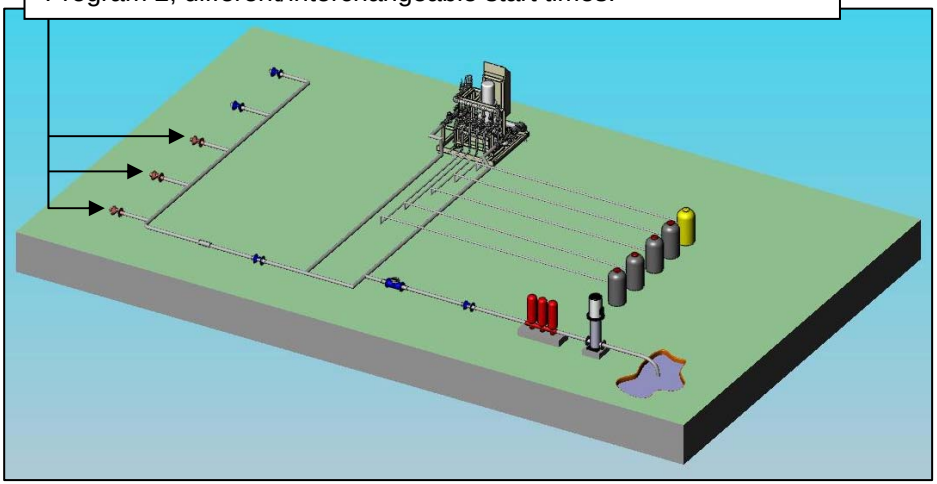

DATE : 1-May-07 TIME : 13:11:33
IRRIGATION PROGRAM
Program: Priority: -- Const. 0%
Start Time 08:00 10:30 12:30
Clock Start 2 2 2
Min. Time 01:00 00:30 01:00
Valve # 001+002 003
Run Time # 1 1 2
Dosing Prog 1 1 2
Day: 02/03 1 3
Dose/Water D W D

Irrigation program for a group and individual valve




**C1**= cycle 1
**C2**= cycle 2

Valve 1 & 2- runs 6 cycles simultaneously on Run Time & Dosing Program 1, valve 3 runs after valves 1& 2 on Run time & Dosing Program 2, different/interchangeable start times.

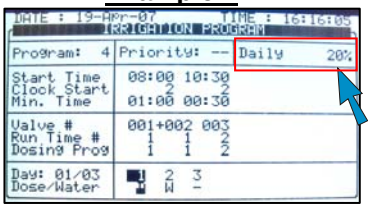


***NOTE:*** *Different/interchangeable delays (multiple start time) dividing the day into periods*

***NOTE:*** *Min. Time= Delay between cycles from start to start*
*Clock Start= Number of cycles in every period (start time)*

***Depending on weather conditions, increase/decrease amount of water emitted from valves without changing the program.***

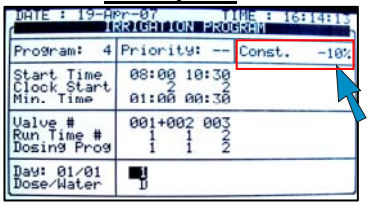
**Example 4**


DATE : 19-APr-07 TIME : 16:16:05
IRRIGATION PROGRAM
Program: 4 Priority: -- Daily 20%
Start Time 08:00 10:30
Clock Start 2 2
Min. Time 01:00 00:30
Valve # 001+002 003
Run Time # 1 1 2
Dosing Prog 1 1 2
Day: 01/03
Dose/Water D W -

If a lot of radiation, want to irrigate more, +20%
*(Regular 10min. runtime⇨12 min.)*

***NOTE:*** *Daily = Current day only. Regular program will resume the following day.*

**Example 5**

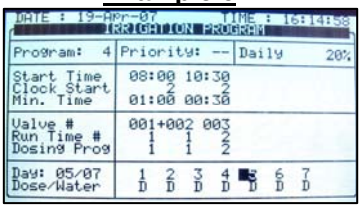

DATE : 19-APr-07 TIME : 16:14:1
IRRIGATION PROGRAM
Program: 4 Priority: -- Const. -10%
Start Time 08:00 10:30
Clock Start 2 2
Min. Time 01:00 00:30
Valve # 001+002 003
Run Time # 1 1 2
Dosing Prog 1 1 2
Day: 01/01
Dose/Water D

If there is bad weather, want to irrigate less, -10%
*(Regular 10min. runtime⇨9 min.)*

***NOTE:*** *Const.= Constant running of program on daily basis. May increase/decrease amount of water in this mode according to weather conditions.*

***Select water/dosing program by days of week***

**Example 6**

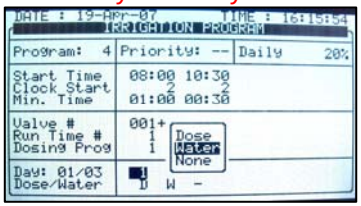

DATE : 19-APr-07 TIME : 16:14:58
IRRIGATION PROGRAM
Program: 4 Priority: -- Daily 20%
Start Time 08:00 10:30
Clock Start 2 2
Min. Time 01:00 00:30
Valve # 001+002 003
Run Time # 1 1 2
Dosing Prog 1 1 2
Day: 05/07
Dose/Water D D D D D D D

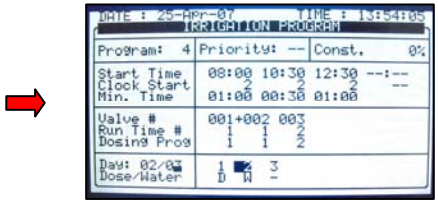
Select program by days of week

| S | M | T | W | TH | F | ST |
|---|---|---|---|---|---|---|
| X | | X | | X | | X |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**OR**

Choose cycle of days





DATE : 25-APr-07 TIME : 13:54:05
IRRIGATION PROGRAM
Program: 4 Priority: -- Const. 0%
Start Time 08:00 10:30 12:30 --:--
Clock Start 2 2 2 --
Min. Time 01:00 00:30 01:00
Valve # 001+002 003
Run Time # 1 1 2
Dosing Prog 1 1 2
Day: 02/03
Dose/Water D W -

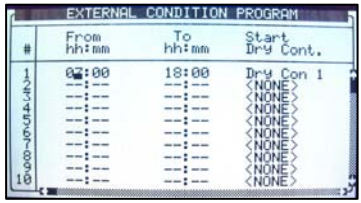
D = Dosing + Water
W = Just Water
\- = Nothing

| S | M | T | W | TH | F | ST |
|---|---|---|---|---|---|---|
| D | W | - | D | W | - | D |
| | | | | | | |
| | | | | | | |
| | | | | | | |

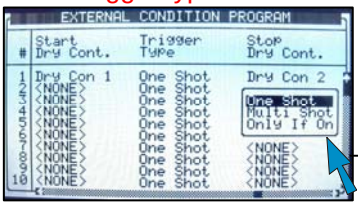
## 2.4 Irrigation Based on External Condition (Field)

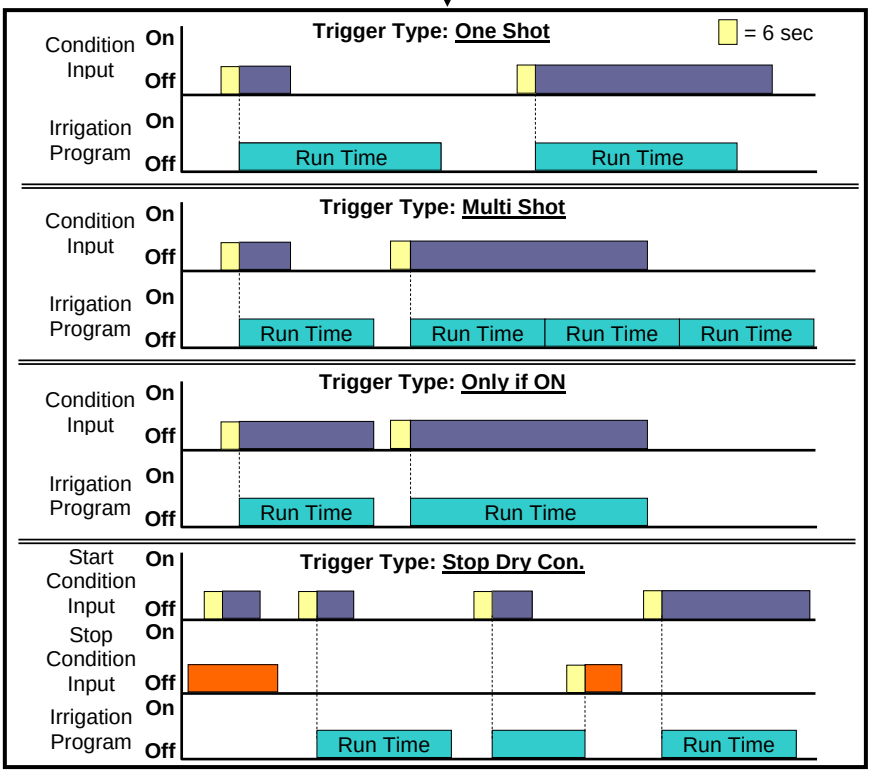
**To operate irrigation by peripheral equipment (i.e., filling a water tank according to level float switch)**

4. Ext. Condition → Set start/end time

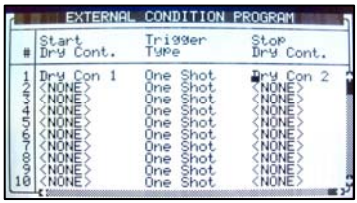



Select trigger type

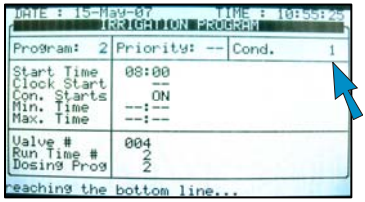


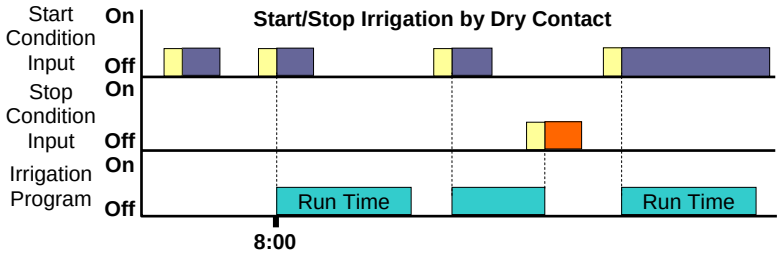



Select dry contact (pre-defined by technician) to start/stop condition and set limit

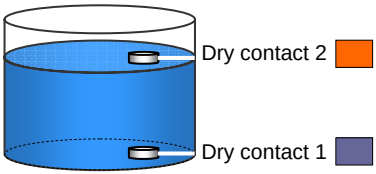


1. Irrigation

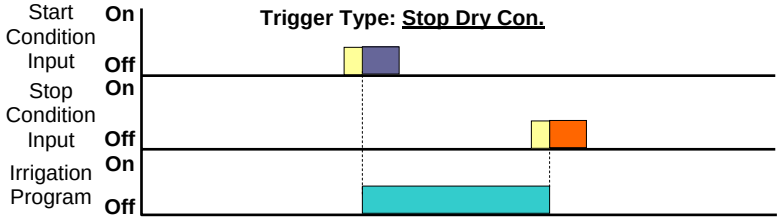



Example of tank filling:

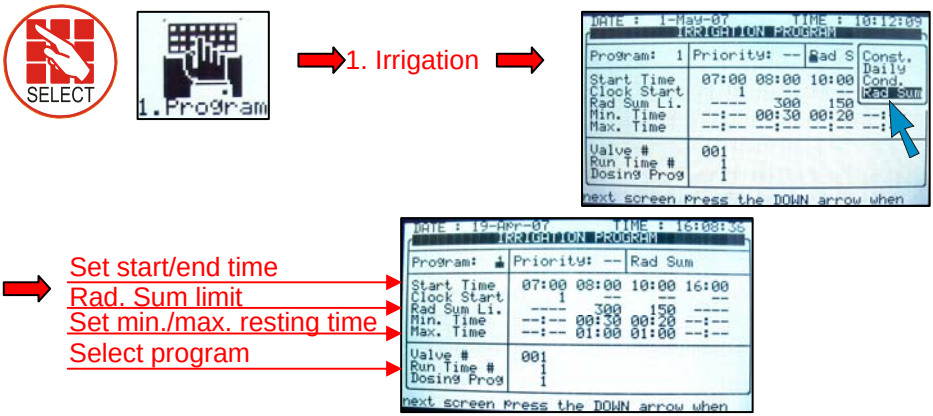



Water Tank with Floats



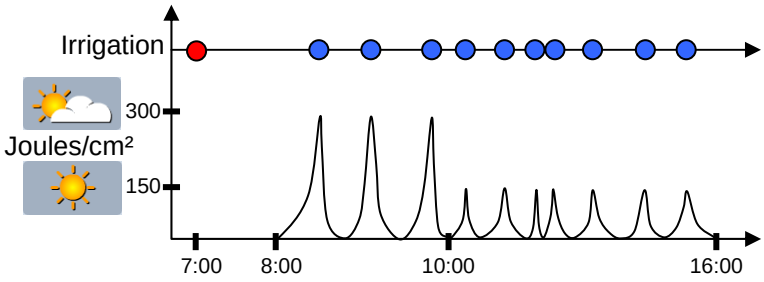
## 2.5 Irrigation Based on Radiation Sum (Greenhouses)

**Set trigger based radiation sum limit Joul/cm²=Energy**




***NOTE:*** *Start Time= When to begin measuring radiation levels to implement irrigation program. Min. rest time most important so as to not irrigate too often when radiation levels fluctuate. In this example, 8:00-10:00 irrigation should occur at most every 30 min. when radiation hits 300joules/cm².Max. rest time here indicates that irrigation must occur at least every hour if there is less radiation.*

**Rad. Sum limit 150** **Rad. Sum limit 300**

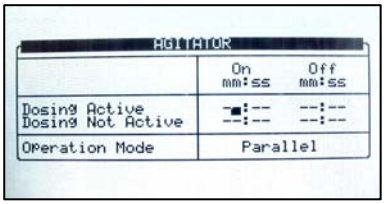



Irrigation by clock start at 7:00
Irrigation by radiation sum

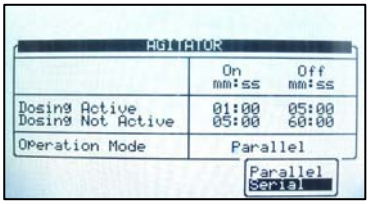
## 2.6 Agitator

**To operate fertilizer tanks with mixing devices**

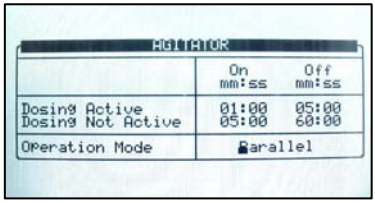
5. Agitator




⇨ Define On/Off time during dosing and when system is idle
⇨ Select Parallel to operate +1 Agitator simultaneously
⇨ Select Serial if not enough power to operate +1 agitator at a time



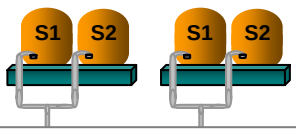

OR

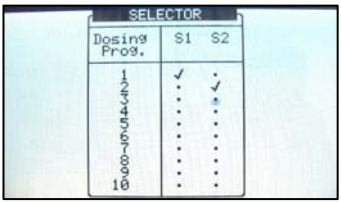


## 2.7 Selector

**+1 fertilizer tank (with different fertilizers) attached to a single dosing channel**

6. Selector

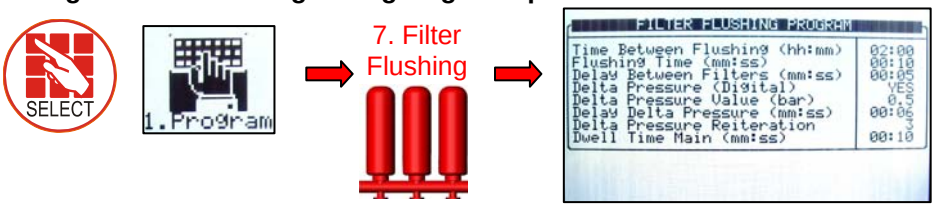



**Dos. Chan. 1 / Dos. Chan. 2**

## 2.8 Filter Flushing

**Program filter flushing during irrigation process**

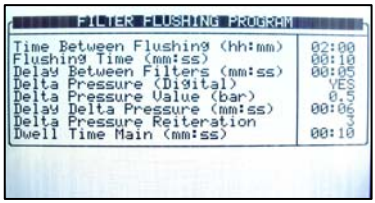



***NOTE:*** *Filter flush process can start only after main water line is full. Default set at 1 min., see menu 3.3.*

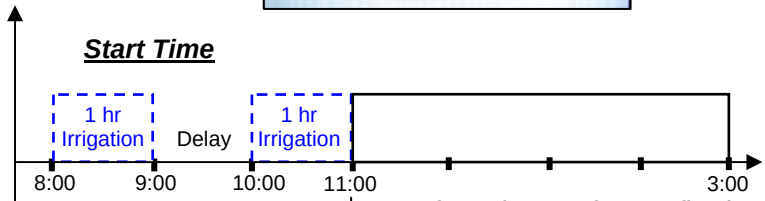
ALARM DEFINITION
Water Fill Up (min) 1
Water Leak (m3) 1.000
Water Leak Period (hh:mm) 00:30
Identify Leak-Subtr. Meter? NO
Dosing Channel Leak Delay(s) 5
Dosing Channel Leak (Pulse) 10
Dosing Flow Difference (%) 25
Missing Pulses For No Flow 10
Stop System Cons.Flow Alarms --
# of Irrig. Without Drainage 4
Low Pressure Alarm (bar) 2.5
No. Of Short Circ. To Pause 3

***NOTE:*** *See graph on next page for further information.*

| **Item** | **Description** |
|---|---|
| Time Between Flushing | Time between flushes accumulated during set irrigation time (one filter flush a time). |
| Flush Time | Flush time per filter. |
| Delay Between Filters | Set delay between flushes to build up pressure. |
| Delta Pressure | Set flush by pressure sensor. Pressure at filter inlet/outlet, if there is a significant difference, a filter may be blocked. |
| Delta Pressure Value (sensor) | If there is a differential, (DP signal or Analog DP value), a flush is needed. |
| Delta Pressure Delay | Set delay to verify if there is a definite blockage. |
| Delta Pressure Reiteration | Set to give signal after XX flushes. If Delta Pressure still indicates a blockage, an alarm will be raised. |
| Dwell Time Main | Open main filter valve before flush to balance pressure for a reliable flushing process. |

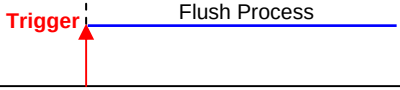

FILTER FLUSHING PROGRAM
Time Between Flushing (hh:mm) 02:00
Flushing Time (mm:ss) 00:10
Delay Between Filters (mm:ss) 00:05
Delta Pressure (Digital) YES
Delta Pressure Value (bar) 0.5
Delay Delta Pressure (mm:ss) 00:06
Delta Pressure Reiteration 3
Dwell Time Main (mm:ss) 00:10

***Start Time***

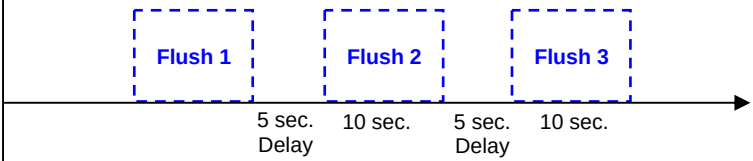



*After 2 hours of water flowing through filters, flush every filter for 10 seconds.*

***Trigger***

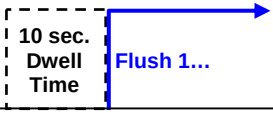



***Flush Time/Delay Between Filters***

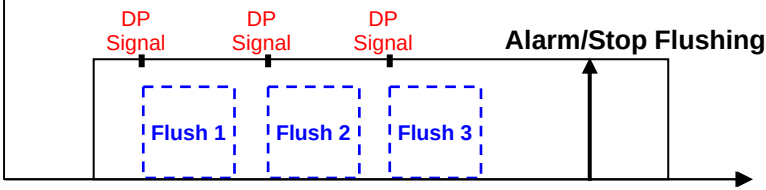



*10 seconds of flushing with 5 second delay between flushes/filters.*

***Dwell Time Main***




***Delta Pressure Reiteration***



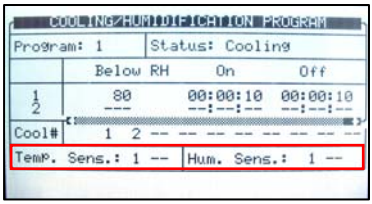

*After 3 flushes, if Delta Pressure shows a blockage, system will raise an alarm.*

## 2.9 Cooling

**Set cooling program for cooling/humidification process in greenhouses. This program will operate according to temperature, humidity or time (to reduce temp, increase hum.)**

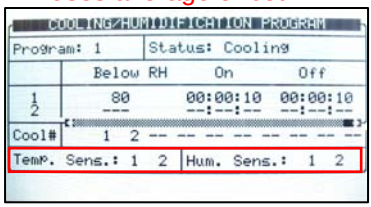
→ 8. Cooling → Set On/Off time and select sensors

Temp. Sens. 1
Hum. Sens. 1

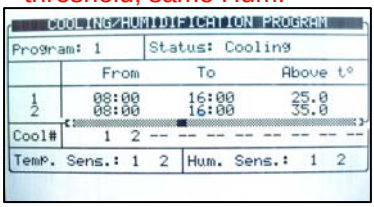



OR

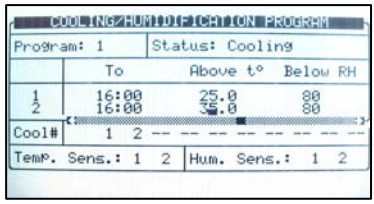
+1 of each sensor:
uses average of both



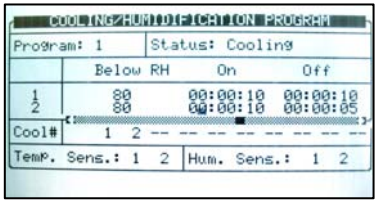

Dynamic cooling: 2 temp. threshold, same Hum.



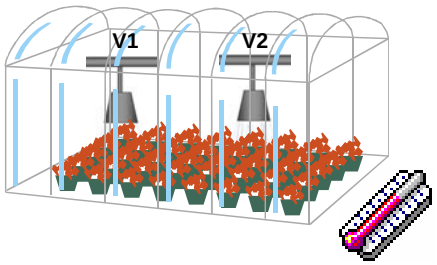

→

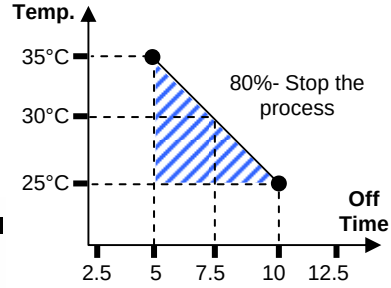



→




On time is set.
Off time can be controlled according to temp.
High temp.= less off time
Low temp.= more off time

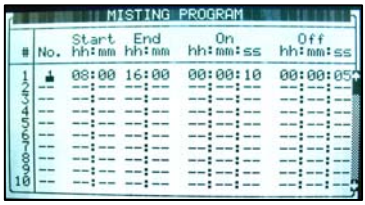


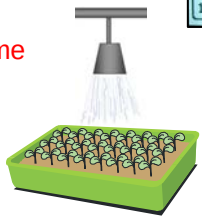
## 2.10 Misting

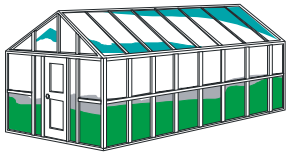
**General program using a timer**

9. Misting




⇨ Define Start/End time
⇨ Define misting On/Off time

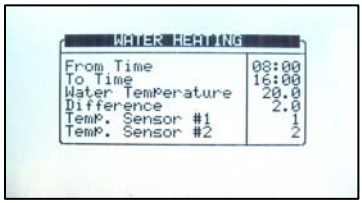




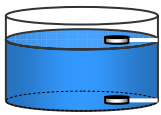
## 2.11 Water Heating

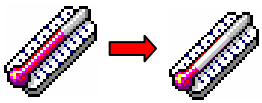
**Heat water in cold areas/seasons**

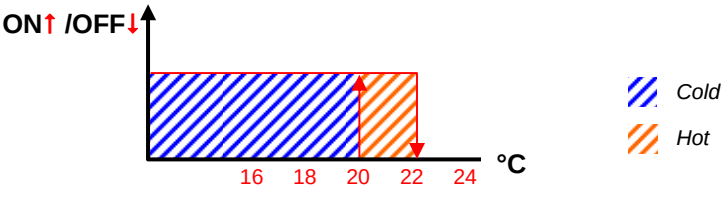
10. Water Heating




⇨ Define Start/End time
⇨ Define Water Temp. ± Difference (dead band) to stop
⇨ Define sensors





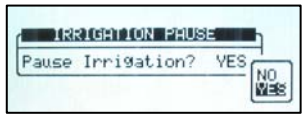


# 3. MANUAL

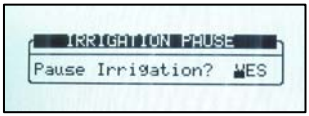
## 3.1 System Pause

**Manually pause system during an irrigation program (EC/pH calibration, fix pipes…)**

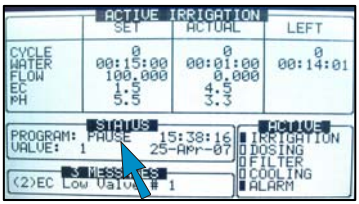
→ 1. Irrigation pause →




→




→ Menu →

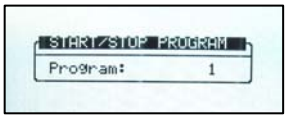



→ To resume, reverse steps above and select NO

## 3.2 Start/Stop program

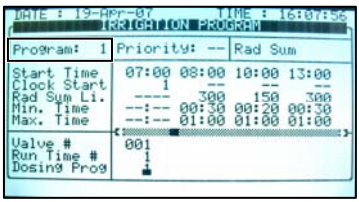
**Manually start/stop a program**

→ 2. Start/Stop Program → Select program




→ Yes → Menu → To resume, reverse steps above and select NO

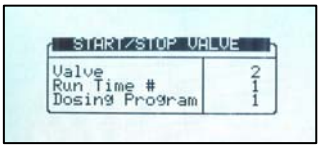
***NOTE:*** *Start 1 cycle only from program 1*



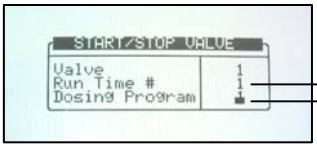
## 3.3 Start/Stop Valve

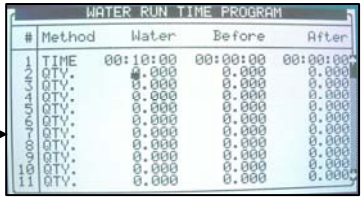
**Manually start/stop a valve**

→ 3. Start/Stop Valve → Select Valve and corresponding Run Time/Dosing program

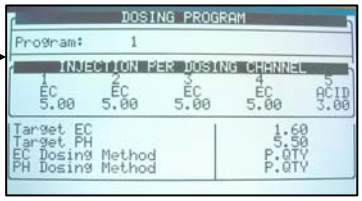



→ Menu → Yes → To resume, reverse steps above and select NO




Run Time Program (1)

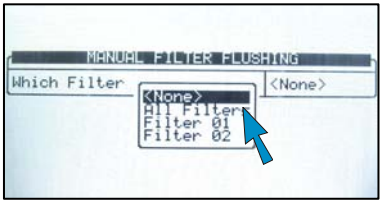


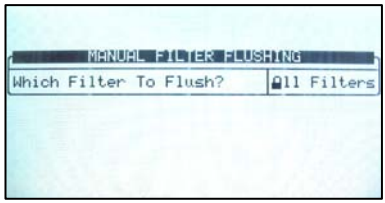

Dosing Program (1)

## 3.4 Manual Filter Flush

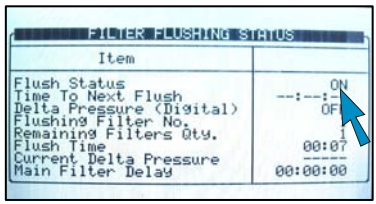
**Manual filter flush only when system is irrigating**

➡ 4. Filter Flush ➡ Select filters (usually all)



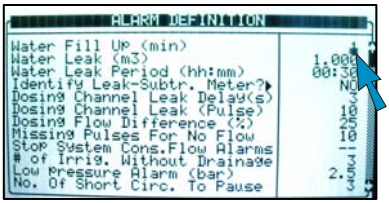




➡ Yes ➡ Menu ➡ Hot Screen 5 to view flushing status




***NOTE:*** *"All Filters" means all filter's but 1 at a time.*
*No more than 1 filter may be flushed at a time.*

***NOTE:*** *Filter flush process can start only after main water line is full. Default is 1min. as shown in picture below (See menu 3.3*

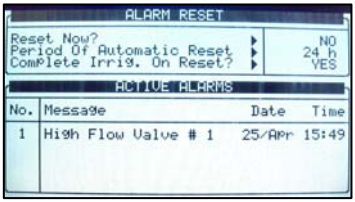


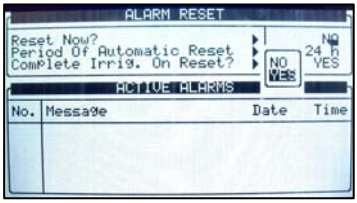
# 4. ALARM

## 4.1 Reset

**Reset alarm (in case of high flow, low flow, water leak, fertilizer leak…)**

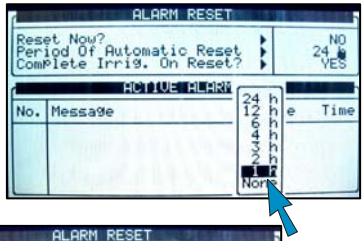
➡ 1. Alarm Reset ➡ Option A: Reset manually




➡ Yes

Option B: Automatic reset to check itself every so often as desired:
⇨ Select how often system should reset itself

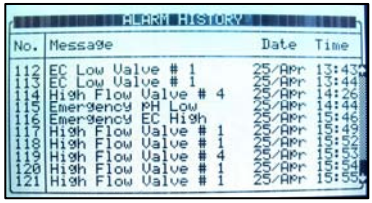


➡ "Complete Irrig. On Reset?" Select Yes or No

## 4.2 Alarm History

**View alarm history (Read-Only)**

➡ 2. History


ALARM HISTORY
No.
Message
Date
Time
112 EC Low Valve # 1 25/Apr 13:43
113 EC Low Valve # 1 25/Apr 13:44
114 High Flow Valve # 4 25/Apr 14:26
115 Emergency PH Low 25/Apr 14:44
116 Emergency EC High 25/Apr 15:46
117 High Flow Valve # 1 25/Apr 15:49
118 High Flow Valve # 1 25/Apr 15:52
119 High Flow Valve # 4 25/Apr 15:53
120 High Flow Valve # 1 25/Apr 15:54
121 High Flow Valve # 1 25/Apr 15:55

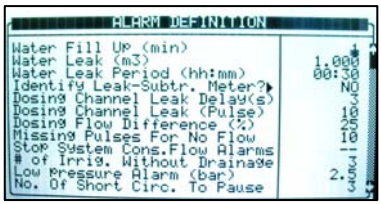
***NOTE:*** *Logs up to 250 alarms*

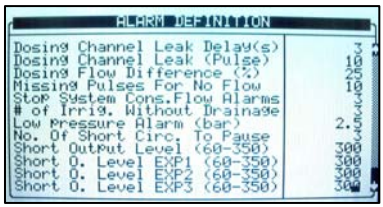
## 4.3 Alarm Definition

**Define system threshold**

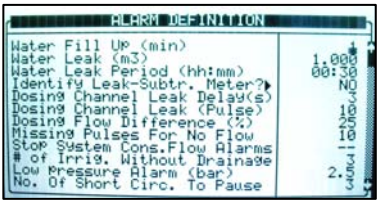
→ 3. Alarm Definition

→ Define trigger: deviation from target pressure, flow…




| Item | Description |
|---|---|
| Water Fill Up (min) | Time of filling the main irrigation line. In that time, the system will ignore high flow alarm and won't implement a filter flushing process. |
| Water Leak (m3 or Gal) | Quantity of water leaking while the system is in idle. |
| Water Leak Period (hh:mm) | Time frame to measure the water leak quantity Example; 1m$^3$ was leaking in less than 30min. |
| Identify Leak-Subtr. Meter? | This setting relevant only when working in "Water source" method. User can ignore or identify a water leak. |
| Dosing Channel Leak Delay (s) | Delay between switching off a dosing channel and generating dosing leak alarm. |
| Dosing Channel Leak (Pulse) | Number of pulses (by dosing meter) during the delay above to generate an alarm. Example; 10 pulses in 3 seconds will generate alarm. |
| Dosing Flow Difference (%) | Difference between calculated and measured dosing channel flow. Example; Dosing Channel 1 defined by technician as 100liter/hour, but if the system measured less than 75liter/hour or more than 125liter/hour, an alarm will be generated. |


ALARM DEFINITION
Water Fill Up (min)
Water Leak (m3) 1.000
Water Leak Period (hh:mm) 00:30
Identify Leak-Subtr. Meter? NO
Dosing Channel Leak Delay(s)
Dosing Channel Leak (Pulse) 10
Dosing Flow Difference (%) 25
Missing Pulses For No Flow 10
Stop System Cons.Flow Alarms --
# of Irrig. Without Drainage
Low Pressure Alarm (bar) 2.
No. Of Short Circ. To Pause

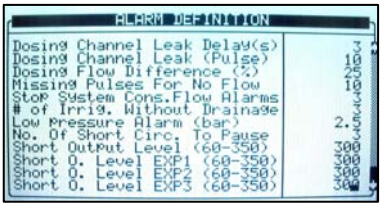

ALARM DEFINITION
Dosing Channel Leak Delay(s)
Dosing Channel Leak (Pulse) 10
Dosing Flow Difference (%) 25
Missing Pulses For No Flow 10
Stop System Cons.Flow Alarms
# of Irrig. Without Drainage
Low Pressure Alarm (bar) 2.
No. Of Short Circ. To Pause
Short OutPut Level (60-350) 300
Short O. Level EXP1 (60-350) 300
Short O. Level EXP2 (60-350) 300
Short O. Level EXP3 (60-350) 300

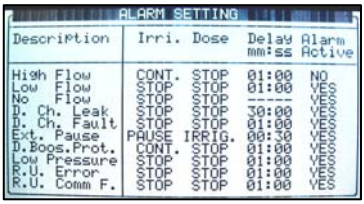
*Table continued…*

| Item | Description |
|---|---|
| Missing Pulses For No Flow | Number of missing pulses before the system will generate a No Flow alarm. The system calculates the expected time between pulses of water meter and if a certain time elapsed without receiving the desired number of pulses, then generate an alarm. |
| Stop System Consecutive Flow Alarms | Number of consecutive flow alarms of the same type (high flow, low flow etc') but different valves before the system is stopped. Example; High flow at valve 1 ->High flow at valve 2->High flow at valve 3 = 3 consecutive High flow, then system stops. |
| # of Irrigations Without Drainage | Number of irrigations given without measuring drainage, above which an alarm will be generated. Common reasons: Irrigation quantity is too small so there is not enough drain, or drain measurement malfunction because of technical problem. |
| Low Pressure Alarm (bar/psi) | Minimum system pressure before generate an alarm. |
| Num. Of Short Circ. To Pause | Number of short circuit (in field device) alarms measured before the system is paused. |
| Short Output Level (60-350) | Define the A/D threshold value to be considered as a short circuit (For technician use only). |
| Short O. Level EXT1 (60 – 350) | Define the A/D threshold value to be considered as a short circuit for Extension box no. 1 (For technician use only) |
| Short O. Level EXT2 (60 – 350) | Define the A/D threshold value to be considered as a short circuit for Extension box no. 2 (For technician use only) |
| Short O. Level EXT3 (60 – 350) | Define the A/D threshold value to be considered as a short circuit for Extension box no. 3 (For technician use only) |

## 4.4 Alarm Setting

**Set alarms and define action in event of an alarm**

➡ 4. Alarm Setting

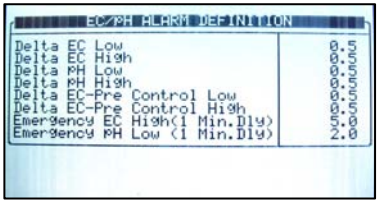

ALARM SETTING
Description | Irri. | Dose | Delay mm:ss | Alarm Active
High Flow | CONT. | STOP | 01:00 | NO
Low Flow | STOP | STOP | 01:00 | YES
No Flow | STOP | STOP | ----- | YES
D. Ch. Leak | STOP | STOP | 30:00 | YES
D. Ch. Fault | STOP | STOP | 01:00 | YES
Ext. Pause | PAUSE | IRRIG. | 00:30 | YES
D.Boos.Prot. | CONT. | STOP | 01:00 | YES
Low Pressure | STOP | STOP | 01:00 | YES
R.U. Error | STOP | STOP | 01:00 | YES
R.U. Comm F. | STOP | STOP | 01:00 | YES

- ⇨ Define alarm action: automatically stop or continue.
- ⇨ Delay before generating alarm.
- ⇨ Alarm output activation: YES/NO (siren, light).

## 4.5 EC/pH Alarm Definition

**Define EC/pH threshold**

➡ 5. EC/pH Alarm Definition

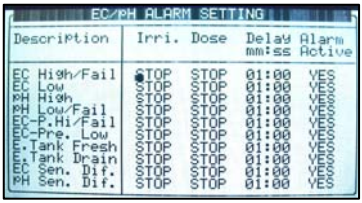

EC/PH ALARM DEFINITION
Delta EC Low 0.5
Delta EC High 0.5
Delta PH Low 0.5
Delta PH High 0.5
Delta EC-Pre Control Low 0.5
Delta EC-Pre Control High 0.5
Emergency EC High(1 Min.Dly) 5.0
Emergency PH Low (1 Min.Dly) 2.0

- ⇨ Delta Low: Maximum differences bellow EC, pH and EC Pre-Control targets.
- ⇨ Delta High: Maximum difference above EC, pH and EC Pre-Control targets.
- ⇨ Emergency: Critical values of High EC and Low pH that stop the system after 1min.

## 4.6 EC/pH Alarm Setting

**Set EC/pH alarm and define action in event of an EC/pH alarm**

➡ 6. EC/pH Alarm Setting


EC/PH ALARM SETTING
Description | Irri. | Dose | Delay mm:ss | Alarm Active
EC High/Fail | STOP | STOP | 01:00 | YES
EC Low | STOP | STOP | 01:00 | YES
PH High | STOP | STOP | 01:00 | YES
PH Low/Fail | STOP | STOP | 01:00 | YES
EC-P.Hi/Fail | STOP | STOP | 01:00 | YES
EC-Pre. Low | STOP | STOP | 01:00 | YES
F.Tank Fresh | STOP | STOP | 01:00 | YES
F.Tank Drain | STOP | STOP | 01:00 | YES
EC Sen. Dif. | STOP | STOP | 01:00 | YES
PH Sen. Dif. | STOP | STOP | 01:00 | YES

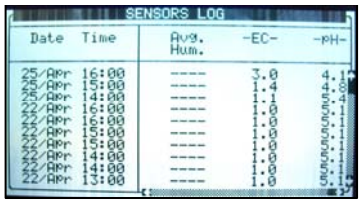
- ⇨ Define EC/pH alarm action: automatically stop or continue.
- ⇨ Delay before generating alarm.
- ⇨ Alarm output activation: YES/NO (siren, light).

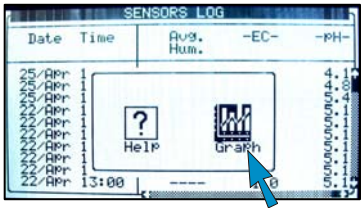
# 5. HISTORY

## 5.1 System History

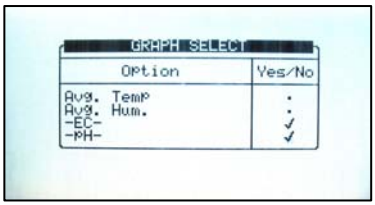
**Read-Only screens of system's history (measurements, settings, processes, events, graphs…)**

11. Sensor Log

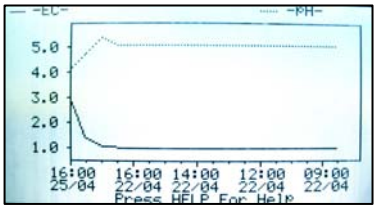



Select sensors using +/- key (no more than 3 per graph)



Menu

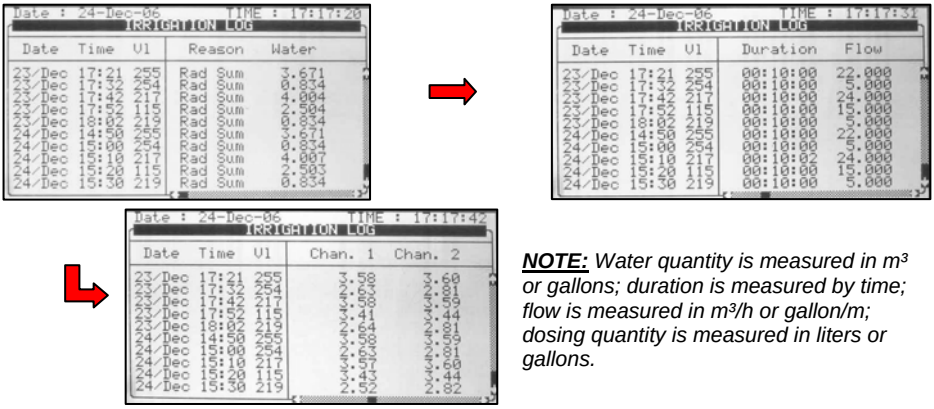



***NOTE:*** *Use ⇧⇩ arrow keys to zoom in/out. Use ⇦⇨ arrow keys to scroll.*

**The history menu provides extensive information regarding measurements and processes performed by the NMC-DC.**

## IRRIGATION LOG

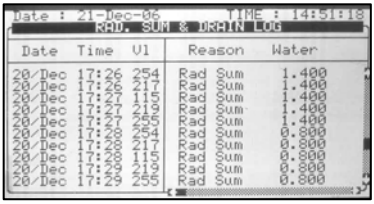
The Irrigation Log table includes up to 200 rows of the last irrigations' data.
Each row includes information regarding a specific irrigation.
To view additional information, use the left/right arrow keys.
To switch between dosing quantities or time simply press the '+/-' key.

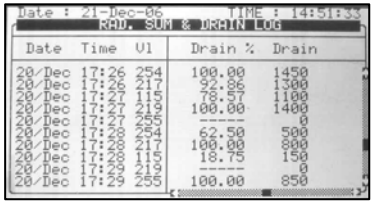


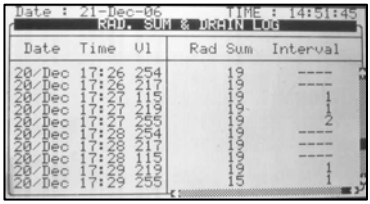

***NOTE:*** *Water quantity is measured in m³ or gallons; duration is measured by time; flow is measured in m³/h or gallon/m; dosing quantity is measured in liters or gallons.*

| Item | Description |
|---|---|
| Date | Date in which the irrigation started. |
| Time | Time in which the irrigation started. |
| Valve | Leading valve; the first valve set for the group of valves |
| Reason | Specification of the irrigation triggers; time, condition, Rad Sum, etc. |
| Water | Irrigation quantity (m³ or gallon) or irrigation time. |
| Duration | Irrigation duration (hh:mm:ss). |
| Flow | Average flow throughout the irrigation cycle. |
| Chan. # | Dosing quantities per channel (liter or gallon) or dosing time. |
| EC Low | Lowest EC value recorded during irrigation. |
| EC Avg. | Average EC value recorded during irrigation. |
| EC High | Highest EC value recorded during irrigation. |
| pH Low | Lowest pH value recorded during irrigation. |
| pH Avg. | Average pH value recorded during irrigation. |
| pH High | Highest pH value recorded during irrigation. |

RAD. SUM & DRAIN LOG



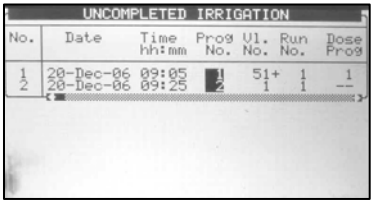




| Item | Description |
|---|---|
| Time | Time irrigation started. |
| Valve | Leading valve. |
| Reason | Specification of the irrigation triggers; time, condition, Rad Sum, etc. |
| Water | Irrigation quantity ($m^3$ or gallon) or irrigation time. |
| Drain % | Percentage of drain for relevant irrigation cycle. |
| Drain | Drain quantity related to relevant irrigation. |
| Rad Sum | Accumulated radiation sum level when irrigation started. |
| Interval | Time (in minutes) since last irrigation cycle. Refers to the last irrigation of a specific valve. |

UNCOMPLETED IRRIGATION

The Uncompleted Irrigation table provides information of irrigations that were started but could not be completed due to a failure. To understand why irrigation was not completed, it is advisable to cross-reference between this table and the Alarm Definition in section 4.3. The Uncompleted Irrigation table consists of up to 200 lines. Note that if the letter 'C' appears, it refers to a program that was triggered by condition program.



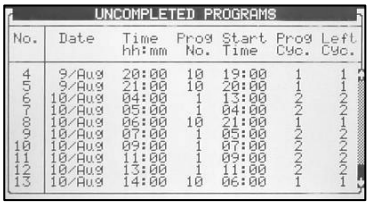

Each line includes information regarding when the irrigation was stopped and added to the uncompleted irrigations table.

| Item | Description |
|---|---|
| Date | Date in which the current line was added to the uncompleted irrigation table. |
| Time | Time in which the current line was added to the uncompleted irrigation table |
| Prog. No. | 92- The program that was added to the table was started manually.<br>93- The relevant irrigation was added to the uncompleted irrigations table for the second time (or more) consecutively. |
| Vl. No. | Indicates the associated valve. If a group of valves that is configured to irrigate together is stopped, only the first valve is written but a '+' sign is added next to it to indicate that more valves are associated. |
| The NMC-DC will attempt to complete the irrigations from the current day (until end day time) upon manual or automatic alarm reset.<br>The valve column of irrigations that are to be completed will be highlighted.<br>The valve column of irrigations that are currently being completed will blink. | |
| Run No | Indicates the associated run time program. |
| Dose Prog. | Indicates the associated dosing program. |
| Prog. Qty. | Planned quantity according to the run time program. |
| Left Qty. | Uncompleted quantity. |

In order to manually stop an uncompleted irrigation you must go to the START/STOP VALVE in section 3.3 because the activation is according to single valves.

## UNCOMPLETED PROGRAMS

The Uncompleted Programs table provides information on programs that could not be completed. It is important to understand the difference between this table and the Uncompleted Irrigations table; this table consists only of irrigation cycles that haven't been started and could not be completed during the current day. This can happen due to wrong system setup (more tasks than could be completed), or because the system was not active for a long period of time, for example due to a power failure, and could not complete its tasks.




The uncompleted program table consists of 200 lines.

## DAILY IRRIGATION

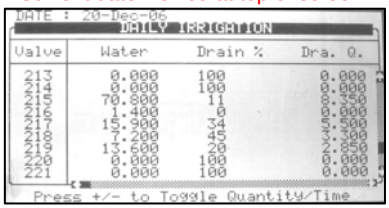
This table allows you to view history of irrigation quantities or time per valve.

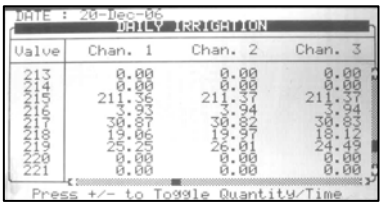
Example: 1 day ago means you would like to view yesterday's history, and Today means you would like to view the accumulated history since the last End Day.

To open the selection list

Relevant day using arrow keys → ENTER

Current date viewed at top of screen.

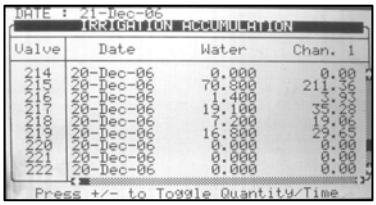



Daily Irrigation table contains all water (m3 or gallon) and dosing (liter or gallon). To toggle the view between quantities and time, press the '+/-' key.

## IRRIGATION ACCUMULATION

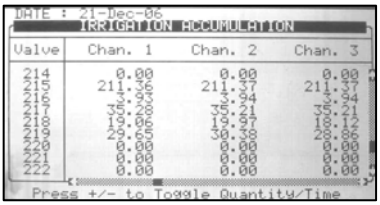
The Irrigation Accumulation table allows you to accumulate water and dosing quantities for the required periods. The accumulation of each valve can be reset separately in the ACCUMULATION RESET table.


DATE : 21-Dec-06
IRRIGATION ACCUMULATION

| Valve | Date | Water | Chan. 1 |
|---|---|---|---|
| 214 | 20-Dec-06 | 0.000 | 0.00 |
| 215 | 20-Dec-06 | 70.800 | 211.36 |
| 216 | 20-Dec-06 | 1.400 | 2.93 |
| 217 | 20-Dec-06 | 19.100 | 35.28 |
| 218 | 20-Dec-06 | 7.200 | 19.06 |
| 219 | 20-Dec-06 | 16.800 | 29.65 |
| 220 | 20-Dec-06 | 0.000 | 0.00 |
| 221 | 20-Dec-06 | 0.000 | 0.00 |
| 222 | 20-Dec-06 | 0.000 | 0.00 |

Press +/- to Toggle Quantity/Time

To toggle the view between quantities and time, press the '+/-' key


DATE : 21-Dec-06
IRRIGATION ACCUMULATION

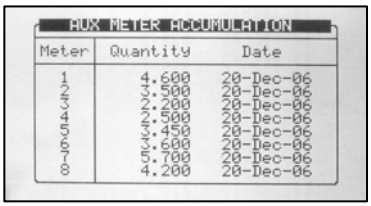
| Valve | Chan. 1 | Chan. 2 | Chan. 3 |
|---|---|---|---|
| 214 | 0.00 | 0.00 | 0.00 |
| 215 | 211.36 | 211.37 | 211.37 |
| 216 | 2.93 | 2.94 | 2.94 |
| 217 | 35.28 | 35.21 | 35.21 |
| 218 | 19.06 | 19.37 | 18.12 |
| 219 | 29.65 | 30.38 | 28.86 |
| 220 | 0.00 | 0.00 | 0.00 |
| 221 | 0.00 | 0.00 | 0.00 |
| 222 | 0.00 | 0.00 | 0.00 |

Press +/- to Toggle Quantity/Time

Water quantity is measured in cubic meter or gallons; dosing quantity is measured in liters or gallons.

## AUX METER ACCUMULATION

The Auxiliary Meter Accumulation table allows you to accumulate quantities from meters that do not have designated software, for example, in order to measure the drain water quantity or to measure the cooling system's consumption.


AUX METER ACCUMULATION

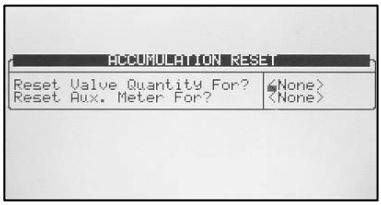
| Meter | Quantity | Date |
|---|---|---|
| 1 | 4.600 | 20-Dec-06 |
| 2 | 3.500 | 20-Dec-06 |
| 3 | 2.200 | 20-Dec-06 |
| 4 | 2.500 | 20-Dec-06 |
| 5 | 3.450 | 20-Dec-06 |
| 6 | 2.600 | 20-Dec-06 |
| 7 | 5.700 | 20-Dec-06 |
| 8 | 4.200 | 20-Dec-06 |

The quantities displayed are in liters (gallons) up to 9999.999.

***NOTE:*** Water meters are accumulators only and are not a part of the irrigation control.

To reset an auxiliary meter refer to the ACCUMULATION {XE "Reset Total Quantity" } table below.

## ACCUMULATION RESET



ENTER to reset accumulation of a specific valve or all valves

Desired option using arrow keys

ENTER

***NOTE:*** When resetting a valve (or all valves), its history will be erased from the following tables:
-Daily Irrigation
-Irrigation Accumulation

ENTER to reset an individual auxiliary meter or all auxiliary meters

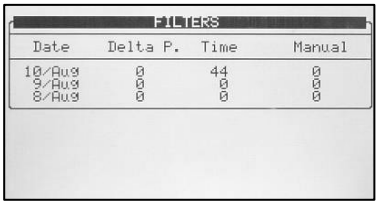
Desired option using arrow keys

ENTER

***NOTE:*** When resetting an Aux meter (or all Aux meters), its history will be erased from the Aux Meter Accumulation table.

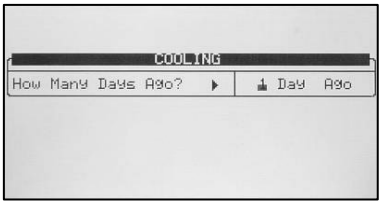
## FILTERS

The filters history table provides daily information of the number and cause of flushing.




## COOLING

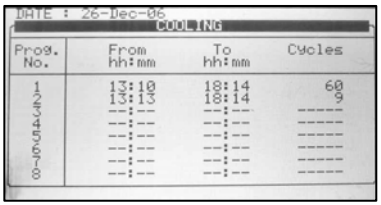
Viewing the history of cooling activities or time per valve is allowed.



ENTER to open selection list

Relevant day using arrow keys

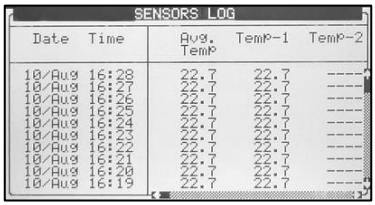
ENTER




For example, 1 day ago means you would like to view yesterday's history, and Today means you would like to view the accumulated history since the last End Day.

SENSOR LOG

The sensors Log table includes history of average measurements of logged sensors. In order to define which sensor to log, the user should access menu 6.8 – Sensor Logging, and mark by +/- button the required sensor.
In order to define the measurement interval, the user should go to menu 6.2 and choose the required History resolution.


SENSORS LOG

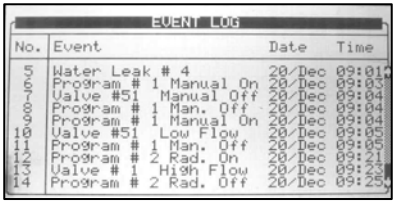
| Date | Time | Avg. Temp | Temp-1 | Temp-2 |
|---|---|---|---|---|
| 10/Aug | 16:28 | 22.7 | 22.7 | ---- |
| 10/Aug | 16:27 | 22.7 | 22.7 | ---- |
| 10/Aug | 16:26 | 22.7 | 22.7 | ---- |
| 10/Aug | 16:25 | 22.7 | 22.7 | ---- |
| 10/Aug | 16:24 | 22.7 | 22.7 | ---- |
| 10/Aug | 16:23 | 22.7 | 22.7 | ---- |
| 10/Aug | 16:22 | 22.7 | 22.7 | ---- |
| 10/Aug | 16:21 | 22.7 | 22.7 | ---- |
| 10/Aug | 16:20 | 22.7 | 22.7 | ---- |
| 10/Aug | 16:19 | 22.7 | 22.7 | ---- |

The sensors Log table contains up to 10,000 data fields. Date and time are 2 fields per line and every sensor is an additional field.

For example: logging of 2 sensors uses 4 data fields; 2 for time and date and 1 for each sensor. In this case, the table will consist of a maximum of 2,500 lines.

EVENT LOG

The table provides information of all the processes performed by the NMC-DC including their time and date.

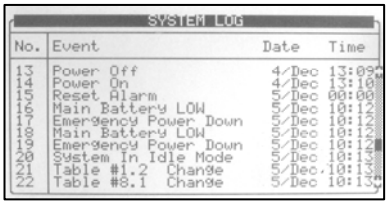

EVENT LOG

| No. | Event | Date | Time |
|---|---|---|---|
| 5 | Water Leak # 4 | 20/Dec | 09:01 |
| 6 | Program # 1 Manual On | 20/Dec | 09:03 |
| 7 | Valve #51 Manual Off | 20/Dec | 09:04 |
| 8 | Program # 1 Man. Off | 20/Dec | 09:04 |
| 9 | Program # 1 Manual On | 20/Dec | 09:04 |
| 10 | Valve #51 Low Flow | 20/Dec | 09:05 |
| 11 | Program # 1 Man. Off | 20/Dec | 09:05 |
| 12 | Program # 2 Rad. On | 20/Dec | 09:21 |
| 13 | Valve # 1 High Flow | 20/Dec | 09:23 |
| 14 | Program # 2 Rad. Off | 20/Dec | 09:25 |

The table consists of the last 999 events.

SYSTEM LOG

This table provides information of all the system changes.


SYSTEM LOG

| No. | Event | Date | Time |
|---|---|---|---|
| 13 | Power Off | 4/Dec | 13:09 |
| 14 | Power On | 4/Dec | 13:10 |
| 15 | Reset Alarm | 5/Dec | 00:00 |
| 16 | Main Battery LOW | 5/Dec | 10:12 |
| 17 | Emergency Power Down | 5/Dec | 10:12 |
| 18 | Main Battery LOW | 5/Dec | 10:12 |
| 19 | Emergency Power Down | 5/Dec | 10:12 |
| 20 | System In Idle Mode | 5/Dec | 10:13 |
| 21 | Table #1.2 Change | 5/Dec | 10:13 |
| 22 | Table #8.1 Change | 5/Dec | 10:13 |

The table consists of the last 999 events.

Examples of system changes are changes of triggered by the controller, the PC communication, a power off, etc.

Main Battery LOW = 11.7 Volts
System In Idle Mode = under 11.7 Volts (Valves are closed)
Emergency Power Down = Main Battery drops to 11.2 Volts (Controller is OFF)